

PCT

INTERNATIONAL PRELIMINARY EXAMINATION REPORT

(PCT Article 36 and Rule 70)

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Applicant's or agent's file reference MR/37742		FOR FURTHER ACTION See Notification of Transmittal of International Preliminary Examination Report (Form PCT/PEA/416)
International application No. PCT/GB 03/00779	International filing date (day/month/year) 21.02.2003	Priority date (day/month/year) 21.02.2002
International Patent Classification (IPC) or both national classification and IPC F04D29/10		
Applicant ALPHA THAMES LTD et al.		

- This international preliminary examination report has been prepared by this International Preliminary Examining Authority and is transmitted to the applicant according to Article 36.
- This REPORT consists of a total of 5 sheets, including this cover sheet.

☒ This report is also accompanied by ANNEXES, i.e. sheets of the description, claims and/or drawings which have been amended and are the basis for this report and/or sheets containing rectifications made before this Authority (see Rule 70.16 and Section 607 of the Administrative Instructions under the PCT).

 These annexes consist of a total of 4 sheets.

- This report contains indications relating to the following items:
 - I ☒ Basis of the opinion
 - II ☐ Priority
 - III ☐ Non-establishment of opinion with regard to novelty, inventive step and industrial applicability
 - IV ☐ Lack of unity of invention
 - V ☒ Reasoned statement under Rule 66.2(a)(ii) with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement
 - VI ☐ Certain documents cited
 - VII ☐ Certain defects in the international application
 - VIII ☐ Certain observations on the international application

Date of submission of the demand 05.09.2003	Date of completion of this report 24.05.2004
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**INTERNATIONAL PRELIMINARY
EXAMINATION REPORT**

International application No. PCT/GB 03/00779

1. Basis of the report

1. With regard to the **elements** of the international application (*Replacement sheets which have been furnished to the receiving Office in response to an invitation under Article 14 are referred to in this report as "originally filed" and are not annexed to this report since they do not contain amendments (Rules 70.16 and 70.17)*):

Description, Pages

1-8 as originally filed

Claims, Numbers

1-16 received on 16.04.2004 with letter of 14.04.2004

Drawings, Sheets

1/3-3/3 as originally filed

2. With regard to the **language**, all the elements marked above were available or furnished to this Authority in the language in which the international application was filed, unless otherwise indicated under this item.

These elements were available or furnished to this Authority in the following language: , which is:

- ☐ the language of a translation furnished for the purposes of the international search (under Rule 23.1(b)).
☐ the language of publication of the international application (under Rule 48.3(b)).
☐ the language of a translation furnished for the purposes of international preliminary examination (under Rule 55.2 and/or 55.3).

3. With regard to any **nucleotide and/or amino acid sequence** disclosed in the international application, the international preliminary examination was carried out on the basis of the sequence listing:

- ☐ contained in the international application in written form.
☐ filed together with the international application in computer readable form.
☐ furnished subsequently to this Authority in written form.
☐ furnished subsequently to this Authority in computer readable form.
☐ The statement that the subsequently furnished written sequence listing does not go beyond the disclosure in the international application as filed has been furnished.
☐ The statement that the information recorded in computer readable form is identical to the written sequence listing has been furnished.

4. The amendments have resulted in the cancellation of:

- ☐ the description, pages:
☐ the claims, Nos.:
☐ the drawings, sheets:

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5. ☐ This report has been established as if (some of) the amendments had not been made, since they have been considered to go beyond the disclosure as filed (Rule 70.2(c)).

(Any replacement sheet containing such amendments must be referred to under item 1 and annexed to this report.)

6. Additional observations, if necessary:

V. Reasoned statement under Article 35(2) with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement

1. Statement

Novelty (N)	Yes: Claims	1-16
	No: Claims	
Inventive step (IS)	Yes: Claims	1-16
	No: Claims	
Industrial applicability (IA)	Yes: Claims	1-16
	No: Claims	

2. Citations and explanations

see separate sheet

**INTERNATIONAL PRELIMINARY
EXAMINATION REPORT - SEPARATE SHEET**

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Re Item V

Reasoned statement under Article 35(2) with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement

The present invention relates to the field of electric motor assemblies according to the preamble of claim 1 and a corresponding method of operating an electric motor according to the preamble of claim 16.

Such electric motor assemblies are known from, for example US-A-5 478 222 (D1).

In applications where a moisture laden gas having a high water vapour content is to be treated, the electric motor of the assembly has to be protected by expensive means, for example either by a separated housing or by special sealings.

With the characterising features of claim 1, i.e. by providing a circulating apparatus for diverting a portion of the fluid acted upon by the impeller in the second housing portion to the first housing portion and by providing of drying means for reducing the moisture content of the gas diverted back to the first housing portion, solves the problem of how to at least reduce the amount of at least substantially dry motor protection gas which needs to be supplied and produces a cost saving in running the assembly.

None of the prior art documents which have become known to this Authority discloses all the technical features of independent claim 1.

Furthermore, the solution to the above mentioned problem in claim 1 of the present application is considered as involving an inventive step (Article 33(3) PCT) since it is not taught or suggested by the prior art documents.

Claims 2-15 are dependent on claim 1 and as such also meet the requirements of the PCT with respect to novelty and inventive step.

Independent claim 16 is the corresponding method claim of operating an electric motor and consequently it also meets the requirements of the PCT with respect to novelty and inventive step.

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Therefore, the present application meets the requirements of Article 33(2) and (3) PCT, because the subject-matter of claims 1-16 is new and involves an inventive step.

Further remarks:

1. Contrary to the requirements of Rule 5.1(a)(ii) PCT, the relevant background art disclosed in the document D1 is not mentioned in the description, nor is this document identified therein.

CLAIMS

1. An assembly comprises a housing (140), an electric motor (130) accommodated within a first portion (142) of the housing, rotating machinery (132) accommodated within a second portion (144) of the housing and driven by the electric motor, separation means (146) in the housing between the first and second portions thereof for separating fluid acted upon by the rotating machinery (132) from the electric motor (130) and gas introduction means (170) for introducing at least substantially dry motor protection gas into the first housing portion (142), characterised by:
- restricted gas flow means (154) for permitting a leakage of the motor protection gas from the first housing portion (142) into the second housing portion (144); and
- circulating apparatus (170) for diverting a portion of the fluid acted upon by the rotating machinery (132) to the first housing portion (142), the circulating apparatus including drying means (174) for reducing the moisture content of the acted upon gas diverted back to the first housing portion (142).
2. The assembly as claimed in claim 1, wherein the gas introduction means (148) includes external means for supplying the at least substantially dry gas (152).
3. The assembly as claimed in claim 2, wherein the means for supplying the at least substantially dry gas comprises a gas drying and supply unit on a remote host facility linked to the first housing portion by an umbilical (148).
4. The assembly as claimed in claim 1, 2 or 3, wherein the drying means (174) separates the diverted portion of the acted upon gas into an at least substantially moisture-free first outlet flow (176) and the circulating apparatus includes first routing means (182) for routing the first outlet flow from a first outlet (178) of the drying means (174) to the housing first portion (142).

5. The assembly as claimed in any preceding claim, wherein the drying means (174) incorporates moisture extracted from the acted upon gas into a second outlet flow (186) from the drying means (174).

5 6. The assembly as claimed in claim 5, wherein the second outlet flow (186) from the drying means (174) is transported away from the assembly by means of the gas being acted upon by the rotating machinery (132).

10 7. The assembly as claimed in claim 5 or 6, including second routing means (190,193) for routing the second outlet flow (186) containing the extracted moisture from a second outlet (188) of the drying means (174) and for incorporating it into the flow of gas acted upon by the rotating machinery (132).

15 8. The assembly as claimed in claim 7, wherein the second routing means (190) incorporates the second outlet flow (186) containing the extracted moisture into the acted upon gas at least substantially prior to it being acted upon by the rotating machinery (132).

20 9. The assembly as claimed in claim 7, wherein the second routing means (193) incorporates the second outlet flow (186) containing the extracted moisture into the acted upon gas at least substantially after it has been acted upon by the rotating machinery (132).

25 10. The assembly as claimed in claim 9, wherein the second routing means includes a pressure equalising device (196) for incorporating the second outlet flow (186) containing the extracted moisture into acted upon gas downstream of the rotating machinery (132).

30 11. The assembly as claimed in any preceding claim, wherein one or more gas outlet flows (176,186) from the drying means (174) pass through one or

more non-return valves (180,192,194) configured to prevent such flow or flows returning directly to said one or more outlets (178,188) of the drying means (174).

5. 12. The assembly as claimed in any preceding claim, wherein the rotating machinery comprises a compressor (132) or a centrifugal pump.

10 13. The assembly as claimed in claim 12, wherein the second housing portion (144) includes a compressor inlet (158) for receiving gas at a first pressure and a compressor outlet (162) for delivering gas at a second pressure higher than the first pressure and the gas flow means (154) enables leakage of the motor protection gas into the second housing portion (144).

15 14. The assembly as claimed in claim 13, wherein the gas flow means (154) is adjacent the compressor inlet (158).

20 15. The assembly as claimed in any preceding claim, including means for automatically maintaining the motor protection gas at a pressure above that of fluid in a part of the second housing portion adjacent the gas flow means (154).

25 16. A method of operating an electric motor (130) accommodated in a first portion (142) of a housing (140) and arranged to drive a rotating machine (132) accommodated in a second portion (144) of the housing in which fluid in the second housing portion (144) which is acted upon by the rotating machine (132) is separated from the first housing portion (142) by separation means (146), the method including providing gas introduction means (170) for introducing at least substantially dry motor protection gas into the first housing portion (142), and providing restricted gas flow means (154) between the first and second housing portions (142,144), characterised by the steps of:

30 establishing a leakage of the motor protection gas from the first housing

portion (142) to the second housing portion (144) via the gas flow means (154);
 providing circulating apparatus (170) and diverting a portion of the acted
 upon gas to the first housing portion (142) via the circulating apparatus; and
 incorporating drying means (174) in the circulating apparatus (170) and
 5 reducing the moisture content of the acted upon gas diverted back to the first
 housing portion (142) by means of the drying means (174).